A. Brief Summary

Claims 1-16 are pending in the present application, where claims 6-8, 10, 11, 15, and 16 have been withdrawn from consideration. By this amendment, claims 1, 12, and 13 have been amended, and claims 21-37 have been added. Accordingly, claims 1-5, 9, 12-14, and 21-37 are currently under consideration. Applicant respectfully submits that these claims are allowable.

By this amendment, claims 1, 12 and 13 have been amended to clarify formal claim structure and not to overcome any rejections based on the prior art.

By this amendment, in the specification, paragraph [0013.1] has been added and paragraphs [0027], [0029], and [0030] have been amended to provide consistent figure labels. These paragraph numbers refer to the paragraphs numbers in the printed application. In addition, citations below of paragraphs in the application refer to paragraph numbers in the printed application which are identical to the paragraphs numbers in the application as filed.

Applicant thanks the Examiner for the careful examination of this patent application.

B. Objections

B1. Objection to the Drawings under 37 C.F.R § 1.83(a)

The Examiner has objected to the drawings under 37 C.F.R § 1.83(a) for allegedly not showing a step opposite a portion of at least one set of fluid dynamic groves. Because Applicant has deleted "opposite a portion of the at least one set of fluid dynamic grooves across the journal gap" from claim 1, Applicant believes this issue is now moot. Applicant requests withdrawal of the objection.

B2. Objection to Claims as Non-Elected Species

On page 5 of the Final Office Action, the Examiner asserted that some claims allegedly were not drawn to the elected species of Figure 3 because Figure 3 allegedly does not show a step "opposite any fluid dynamic grooves on a shaft." As noted above, Applicant has deleted "opposite a portion of the at least one set of fluid dynamic grooves across the journal gap" from independent claim 1. Applicant believes this issue is now moot. Applicant requests withdrawal of the objection.

C. Rejections under U.S.C. § 102(b)

C1. Examiner's Grounds for Rejection of 1-5 and 9

The examiner rejected claims 1-5 and 9 under U.S.C. §102(b) as anticipated by Sakatani et al. (USPN 5046863) (hereinafter "Sakatani"). The Examiner identified lubricant pits on a sleeve and grooves on a shaft in Sakatani with "at least one step" and "at least one set of fluid dynamic grooves", respectively, in claim 1. The Examiner also identified an air escape aperture in Sakatani with a "rotating shaft"

C2. Sakatani Does Not Teach or Suggest Independent Fluid Bearing System Claim 1 as Amended

Applicant has amended claim 1 to recite the following.

> "1. A fluid dynamic bearing system comprising:
> a stationary sleeve;
> a rotating shaft axially disposed through the sleeve;
> a journal gap between the shaft and sleeve, said gap defined by first and second interfacial surfaces between the shaft and sleeve;
> at least one set of fluid dynamic grooves formed on the first interfacial surface of the journal gap; and
> at least one step defined on the second interfacial surface of the journal gap, wherein the at least one step reduces the journal gap in a localized region of the at least one set of fluid dynamic grooves, and wherein the sleeve and shaft are operable to move axially relative to each other during operation such that the at least one step moves toward an apex of the at least one set of fluid dynamic grooves."

The amendment to claim 1 essentially deletes language added to claim 1 by the previous amendment.

Applicant submits that Sakatani fails to teach or suggest amended claim 1. Specifically, Sakatani does not teach or suggest "the at least one step reduces the journal gap in a localized region of the at least one set of fluid dynamic grooves" as recited in amended claim 1. Sakatani also does not teach or suggest "the sleeve and shaft are operable to move axially relative to each other during operation such that the at least one step moves toward an apex of the at least one set

of fluid dynamic grooves" as recited in claim 1 as amended. The Applicant also respectfully submits that the Examiner's rejection based on Sakatani does not identify "a stationary sleeve" and "a rotating shaft" as recited in claim 1 as amended.

Sakatani's Lubricant Pits Widen a Gap

Sakatani does not teach or suggest "the at least one step reduces the journal gap in a localized region of the at least one set of fluid dynamic grooves" as recited in claim 1 as amended. Referring to Figure 4, Sakatani teaches lubricant pits 12 in a sleeve 6 and herringbone-shaped grooves 15 on radial receiving surface 10 on a shaft 4.

> "The sleeve 6 has cylindrical radial bearing surfaces 8 formed on its inner diametrical surface at two axially spaced apart positions, while the thrust receiver 7 has a thrust bearing surface 9. On the other hand, a shaft 4 fit into the sleeve 6 has a radial receiving surface 10 opposed to the radial bearing surface 8 with a gap of a radial bearing and a thrust receiving surface 11 opposed to the thrust bearing surface 9 being in contact therewith. Lubricant pits 12 are disposed in the vicinity of the thrust bearing surface 9 and an air escape aperture 13 is disposed at a portion between the inner diametrical surface of the sleeve 6 and the thrust receiver 7 for communicating the lubricant pit 12 with the external atmosphere. Herringbone-shaped grooves 15 are formed to the radial receiving surface 10." (Col. 1, lines 26-41.)

As shown in Figure 4 of Sakatani, the lubricant pits 12 widen a gap between the sleeve 6 and the herringbone-shaped grooves 15. Therefore, if one were to identify the lubricant pits 12 as a step as the Examiner has, Sakatani would not teach "the at least one step reduces the journal gap in a localized region of the at least one set of fluid dynamic grooves" as recited in amended claim 1.

Sakatani's Shaft and Sleeve are in a Fixed Relative Axial Position

Sakatani does not teach or suggest a "the sleeve and shaft are operable to move axially relative to each other during operation such that the at least one step moves toward an apex of the at least one set of fluid dynamic grooves". Rather, Sakatani teaches a shaft 4 in an axially fixed position in contact with thrust bearing surface 9.

Sakatani teaches a thrust receiver 7 made of a steel ball attached to one end of a sleeve 6.

> "The housing 5 as a rotational body has a sleeve 6 and a thrust receiver 7 made of a steel ball attached to one end thereof, and it is rotatably fit to the shaft 4." (Col. 1, lines 23-26.)

The shaft 4 has a thrust receiving surface 11 in contact with a thrust bearing surface 9 on the steel ball thrust receiver 7 which is axially supported by the shaft 4.

> "On the other hand, a shaft 4 fit into the sleeve 6 has a radial receiving surface 10 opposed to the radial bearing surface 8 with a gap of a radial bearing and a thrust receiving surface 11 opposed to the thrust bearing surface 9 being in contact therewith." (Col. 1 lines 29-34) (Emphasis added.)
>
> Simultaneously, the steel ball of the thrust receiver 7 is axially supported being in contact with the thrust receiving surface 11 at the upper end of the shaft 4. (Col. 1, lines 55-58.) (Emphasis added.)

Sakatani further describes a contact type thrust bearing created by thrust receiving surface 11 on the shaft 4 in contact with thrust bearing surface 9 and mentions a possible substitution of "plain groove dynamic pressure bearing" for the contact type thrust bearing.

> "Further, although a point-contact type sliding bearing is used as the thrust bearing in which the thrust receiver 7 is made of a steel ball and the thrust receiving surface 11 comprises a flat plain, a so-called plain groove dynamic pressure bearing may be used, in which the thrust bearing surface 9 of the thrust receiver 7 is also made as a plain like that the thrust receiving surface 11 and a dynamic pressure generating grooves are disposed to at least one of the both plains." (Col. 4, line 65 - Col. 5, line 5.) (Emphasis added.)

However, the possibility of having the "dynamic pressure generating grooves" generate enough pressure to separate the thrust bearing surface 9 from the thrust receiving surface 11, i.e. move the shaft 4 axially, is inoperable. The shaft 4 is attached to a lower cylinder 3, and the thrust receiver 7 is attached to the housing 5 and upper cylinder 2.

> "That is, a shaft 4 stands vertically at the axial center of a lower cylinder 3. On the other hand, a housing 5 of the dynamic pressure bearing device is secured to the axial center of the upper cylinder 2. The housing 5 as a rotational body has a sleeve 6 and a thrust receiver 7 made of a steel ball attached to one end thereof, and it is rotatably fit to the shaft 4." (Col. 1, lines 20-27.)

Separating the thrust bearing surface 9 from the thrust receiving surface 11 by generating fluid pressure in the lubricant would expel the lubricant from between the thrust bearing surface 9 and the thrust bearing surface 11. But expelling the lubricant from between the two surfaces would result in any separation collapsing under the weight of the upper cylinder 2 and housing 5 attached to the thrust receiver 7. Moreover, Sakatani teaches an air escape aperture 13 near the thrust bearing surface 9.

> "Lubricant pits 12 are disposed in the vicinity of the thrust bearing surface 9 and an air escape aperture 13 is disposed at a portion between the inner diametrical surface of the sleeve 6 and the thrust receiver 7 for communicating the lubricant pit 12 with the external atmosphere." (Col. 1, lines 34-39.) (Emphasis added.)

Therefore, pressure in a lubricant between and near thrust bearing surface 9 and the thrust receiving surface 11 would not be maintained. Instead, pressure in the lubricant would be released by expelling air and lubricant through the air escape aperture 13 into the external atmosphere. Thus, without substantial modification that is not disclosed or motivated by Sakatani, the possibility of having "plain" or planar surfaces with dynamic bearing grooves as part of the thrust bearing between the thrust receiver 7 and the shaft 4 which might also separate the thrust receiver 7 from the shaft 4 is inoperable.

Therefore, Sakatani teaches a "point-contacting bearing" in the form of a steel ball thrust receiver 7 having a thrust bearing surface 9 making contact with a thrust receiving surface 11 at the end of a shaft 4. A replacement of the point-contacting bearing with a "plain-groove dynamic pressure bearing" which might also separate the thrust bearing surface 9 from the thrust receiving surface 11 is to be inoperable. Therefore, the shaft 4 in Sakatani is in an axially fixed position. Therefore, Sakatani does not teach or suggest a "the sleeve and shaft are operable to

move axially relative to each other during operation such that the at least one step moves toward an apex of the at least one set of fluid dynamic grooves" as recited in independent claim 1 as amended.

Examiner's Rejection Does Not Identify "Stationary Sleeve" and "Rotating Shaft"

The Applicant respectfully submits that the Examiner's rejection does not identify "a stationary sleeve" and "a rotating shaft axially disposed through the sleeve" as recited in amended claim 1. On page 3 of the most recent Final Office Action, and in previous office actions, the Examiner labeled elements of Sakatani with language from the Applicant's claim 1: Sakatani's lubricant pits 12 as "stationary sleeve", and Sakatani's air escape aperture 13 as "rotating shaft".

Sakatani teaches a sleeve 6, lubricant pits 12, and an air escape aperture 13. The air escape aperture 13 is between an inner diametrical surface of the sleeve 6 and the (steel ball) thrust receiver 7. See Col. 1 lines 26-41 of Sakatani quoted above. As shown in Figures 1 and 4 of Sakatani, the lubricant pits 12 are formed in the sleeve 6, and the air escape aperture 13 is a tube or channel also formed in the sleeve 6. Therefore, the lubricant pits 12 have a fixed position relative to the air escape aperture 13. Therefore, if the lubricant pits 12 are stationary, the air escape aperture 13 is also stationary. In other words, the air escape aperture 13 does not rotate. Therefore, the Examiner's rejection does not identify "a stationary sleeve" and "a rotating shaft axially disposed through the sleeve" as recited in amended claim 1.

Summary of Arguments Against Claim Rejections Based on Sakatani

Sakatani does not teach "the at least one step reduces the journal gap in a localized region of the at least one set of fluid dynamic grooves" as recited in amended claim 1. Sakatani also does not teach or suggest "the sleeve and shaft are operable to move axially relative to each other during operation such that the at least one step moves toward an apex of the at least one set of fluid dynamic grooves" as recited in claim 1 as amended. Moreover, the Examiner's rejection based on Sakatani does not teach a "stationary sleeve" and "a rotating shaft" as recited in claim 1 as amended.

Therefore, Sakatani fails to teach or suggest claim 1 as amended.

C3. Sakatani Does Not Teach or Suggest Fluid Dynamic Bearing System Dependent Claims 2-5 and 9

Each of claims 2-5 and 9 depends upon independent claim 1. Therefore, Sakatani fails to teach any of claims 2-5 and 9 for the same reasons set forth above that Sakatani fails to teach or suggest claim 1 as amended.

C4. Examiner's Grounds for Rejection of Claims 12-14

The Examiner rejected claims 12-14 under U.S.C. §102(b) as anticipated by Moritan et al. by (USPN 5715116) (hereinafter "Moritan"). The Examiner identified "col. 7, lines 43-46" in Moritan as "fluid bearing means" in claim 12 and a profile in a sleeve in Figure 1(b) in Moritan as "pressure regulating bearing means" in claim 12.

C5. Moritan Does Not Teach or Suggest Independent Fluid Dynamic Bearing Motor Claim 12 as Amended

Applicant has amended claim 12 to recite the following.

> "12. A fluid dynamic bearing motor comprising:
> a stationary sleeve;
> a shaft and hub rotatable in relation to the sleeve;
> a journal defined between the sleeve and the shaft;
> a fluid bearing means between the sleeve and the shaft; and
> a pressure regulating means cooperating with and opposing the bearing means across the journal therefrom to maintain proper axial alignment of the shaft and hub with the sleeve, wherein the shaft and stationary sleeve are operable to move relative to each other such that the pressure regulating means moves axially during operation toward an apex of the fluid bearing means."

The amendment to claim 12 essentially deletes language added to claim 12 by previous amendment.

The Examiner has rejected claims 12-14 under 35 U.S.C. § 102(b) as anticipated by Moritan et al. USPN 5715116 (hereinafter "Moritan"). Applicant respectfully submits that Moritan does not teach or suggest a fluid dynamic bearing motor recited by claim 12 as amended. Specifically, Moritan does not teach or suggest "the shaft and stationary sleeve are

operable to move relative to each other such that the pressure regulating means moves axially during operation toward an apex of the bearing means".

Instead, Moritan teaches a thrust bearing with a thrust plate abutting, i.e. making contact with, an end of a shaft; the shaft is in an axially fixed position. Moritan teaches a spindle motor with a contact thrust bearing between the thrust plate and the shaft.

> "However, the above-mentioned dynamic pressure fluid bearing itself does not have an ability as a thrust load bearing, and hence the conventional dynamic pressure fluid bearing for the memory disk driving apparatus has used another thrust bearing.
> Among various types of thrust bearings, a concise and frequently used configuration comprises a thrust plate and a point contacting top face of the shaft." (Col. 1, lines 53-60) (Emphasis added.)

The term "thrust plate" is defined by Moritan to be a member in contact with a shaft.

> "The thrust plate is the member which faces and contacts the thrust end of the shaft to receive the thrust load, and in case of the thin type spindle motor for driving the memory disk, this member is of course a plate shaped member and hence is herein called the thrust plate in the disclosure." (Col. 4, line 66 – col. 5., line 3.) (Emphasis added.)

Within this context, Moritan teaches a rotor including the thrust bearing having the thrust plate making contact with an end of the shaft.

> "a thrust bearing including a thrust plate disposed at one end of the sleeve for abutting the end portion of the shaft and a predetermined amount of oil confined in a closed space which is formed by the sleeve, the end portion of said shaft and the thrust plate have a connection path to outside open space." (Col. 3, lines 36-41) (Emphasis added.)

This configuration is shown, for example, in Figures 1(c), 2(a), 3(a), and 4(a) of Moritan. Therefore, Moritan teaches a thrust plate 22 point contacting, i.e. abutting, an end of a shaft 12, so the shaft 12 is in a fixed axial position relative to the thrust plate 22. In addition, the thrust

plate 22 is axially fixed relative to the sleeve 21 because the thrust plate 22 and the sleeve 21 are both fixed to the housing (hollow cylinder) 23a.

> "Then, the sleeve 21 is fit in and fixed on the inner wall of a hollow cylinder 23a at the center of the bracket 23. (Hereinafter, the hollow cylinder 23a is called "housing".) Subsequently, the thrust plate 22 is fixed at the bottom face of the housing 23a by means of caulking. Instead of the caulking, press-fit can be applied." (Col. 1 lines 10-16.) (Emphasis added.)

Therefore, the shaft 12 is axially fixed in relation to the sleeve 21 in Moritan. Therefore, Moritan does not teach or suggest "the shaft and stationary sleeve are operable to move relative to each other such that the pressure regulating means moves axially during operation toward an apex of the bearing means" as recited in independent claim 12 as amended.

Therefore, Moritan fails to teach or suggest claim 12 as amended.

C6. Moritan Does Not Teach or Suggest Fluid Dynamic Bearing Motor Dependent Claims 13-14

Each of claims 13 and 14 depends upon independent claim 12. Therefore, Moritan fails to teach either of claims 13 or 14 for the same reasons set forth above the Moritan fails to show, teach, or suggest claim 12 as amended.

D. New Claims

New claims 21-24 depend upon independent claim 1 and are supported by paragraphs [0027] and [0028] of the specification and Figures 2, 3, 4, and 5 as filed.

New claims 25-28 depend upon independent claim 1 and are supported by paragraphs [0032] and [0025] of the specification and Figures 2, 3, 4, and 5 as filed.

New claims 29-32 depend upon claim 14, and hence upon independent claim 12, and are supported by paragraphs [0027] and [0028] of the specification and Figures 2, 3, 4, and 5 as filed.

New claims 33-34 depend upon claim 14, and hence upon independent claim 12, and are supported by paragraphs [0027], [0029], and [0031] of the specification and Figures 2, 3, 4, and

5 as filed.

New claims 35-37 depend upon claim 12 and are supported by paragraphs [0032] and [0025] of the specification and Figures 2, 3, 4, and 5 as filed.

E. CONCLUSION

In view of the above, the Applicants believe each of the presently pending claims in this application is in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw all the outstanding rejections of the claims and to pass this application to issue.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, the Applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. **14-1437** referencing Docket No. 8209.034.NPUS00. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

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